



WE EMBED
ADVANCED TECHNOLOGIES.
**LIKE EARS, EYES,
VOICE AND A BRAIN.**

Are you looking for a New Mission?

Your mission is to gain practical experience while working on your diploma thesis? We are happy to support you with our know-how and experience while working on different projects.

Mission Embedded develops and supplies high-reliability embedded systems for professional applications in safety-critical environments such as special vehicles,

transportation/railway, industry, medical technology, or air traffic control.

Together with the *Christian Doppler Laboratory Embedded Machine Learning* at Vienna University of Technology, we offer a research opportunity for the following Master thesis topic. We are also open for cooperation with other universities and institutes.

MACHINE LEARNING ON EMBEDDED SYSTEMS:

CONSISTENT SEMANTIC SEGMENTATION OF VIDEO OBJECTS

The Christian Doppler Laboratory Embedded Machine Learning does research on Deep Neural Networks (DNN) in resource constrained embedded devices. It studies how energy consumption and resource usage can be minimized while keeping high accuracy. The solution space is characterized by architecture parameters, DNN optimization and transformations, implementation platform configurations, and mapping options. This design space is huge, poorly understood, and it is rapidly evolving.

A Convolutional Neural Network (CNN) for segmentation generally consists of two parts:
(1) feature extractor also called encoder, which compresses the original image and provides low dimensional representation of the original image.
(2) A decoder, which converts back the compressed representation into pixel level classification. When such a semantic segmentation CNN is used for videos, it generates inconsistencies between the frames, because no temporal information is shared between the consecutive frames.

The objective of this thesis project is to include Recurrent Neural Networks (RNN) unit(s), e.g. Long Short-Term Memory (LSTM) or Gated Recurrent Units (GRU), to an existing semantic segmentation CNN and evaluate the corresponding segmentation consistencies between the consecutive frames. This thesis project consists of the following steps:

- Select one of the state-of-the-art segmentation CNNs, e.g. MobileNet3 along with a decoder
- Select an RNN unit(s), e. g. LSTM or GRU
- Train only the RNN unit(s) using a public dataset
- Evaluate the original and the updated CNN+RNN for video consistency

This thesis offers you an excellent opportunity to get into the hot topic of deep learning.

It allows you to become an expert in configuring neural networks. Moreover, you acquire critical skills in using neural networks in embedded systems und resource constraints.

Some of the M.Sc. projects may be combined with a part time position.

Are you ready for your New Mission?
Get in touch with us:

Stefan Mayerhofer
+43 660 8833 901

www.mission-embedded.com
career@mission-embedded.com